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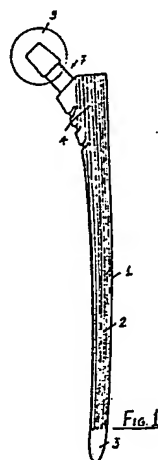
The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

⑤ **Adaptable hip prosthesis.**

⑤ There is disclosed a hip prosthesis structure which can be easily fitted to the geometrical characteristics of the patient coxo-femoral articulation.

This prosthesis essentially comprises a given size stem (1) at the top portion thereto there are provided means (5,20) for firmly coupling one end of a shaped bar or neck (7,23) which bears the spherical head to be coupled to the hip acetabulum.

The shaped bar (7,23) having a variable length and a longitudinal axis of any given extension.



## Description

### HIP PROSTHESIS STRUCTURE ADAPTED FOR EASY FITTING TO THE PATIENT COXO-FEMURAL ARTICULATION

#### BACKGROUND OF THE INVENTION

The present invention relates of a hip prosthesis structure, which is adapted to be easily fitted to the specific shape or geometrical characteristics of the patient coxo-femural articulation.

As is known in the case of fractures, arthritis and the like of the human hip or its articulated joint with the femur, there are presently used suitable hip prostheses in order to provide the hip joint with renewed mobility.

Conventional hip prosthesis structures are usually made as a single piece, consisting of a stem from the top portion of which a neck extends thereon there is applied a spherical head, having any desired diameters.

The thus constructed prostheses, however, have the drawback that they can not be used for any patients, unless said prostheses are specifically adapted in size to the geometrical structure of the hip and femur of the patient.

In fact these prostheses, though they have been tailored in a satisfactory way for a given patient, can not be adapted to other patients mainly because their neck portions have a greater or smaller length than that suitable for providing a proper coxo-femural articulation.

In these cases, as it should be apparent, the prosthesis head can not be properly fitted to the patient acetabulum therewith it should cooperate.

Sometimes, moreover, the patient has a so-called "varus" femur, that is having a rather anomalous shape, and for these femurs particular hip prostheses must be adopted in which the neck portion has a specific preset orientation with respect to the stem.

In this connection, it should be moreover pointed out that the femur neck is not perpendicular to the patient pelvis thereby a normal neck is reversed at about 10° with respect to the pelvis.

Known hip prostheses, on the other hand, are not designed to overcome this drawback and hence they cannot be adapted in a perfect way to the anatomic characteristics of a lot of patients.

#### SUMMARY OF THE INVENTION

Accordingly, the task of the present invention is to overcome the above mentioned drawbacks by providing a hip prosthesis which can be provided with a neck of any desired length, according to requirements.

Within the scope of the above mentioned object, a main object of the present invention is to provide such a hip prosthesis in which the axis of the neck is able of forming a different opening angle with respect to the axis of the stem.

Yet another object of the present invention is to

provide such a hip prosthesis structure in which the axis of the neck has any desired extension, included a broken line extension.

According to one aspect of the present invention, the above mentioned task and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a hip prosthesis structure characterized in that it essentially comprises a given size stem at the top portion of which there are provided means for firmly coupling one end of a shaped bar or neck bearing a spherical head to be coupled to the patient pelvis acetabulum, said shaped bar having a variable length and a longitudinal axis having a set extension.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the hip prosthesis structure according to the present invention will become more apparent hereinafter from the following detailed description of a preferred though not exclusive embodiment thereof, which is illustrated, by way of an indicative example, in the figures of the accompanying drawings, in which:

figure 1 is a side view of the hip prosthesis structure according to the present invention;

figure 2 shows a front view of the prosthesis stem;

figure 3 is a cross-sectional view illustrating the coupling between the stem and neck of the prosthesis;

figure 4 shows a possible embodiment of the prosthesis neck;

figures 5 to 9 show other possible embodiments of necks adapted to be applied on the prosthesis stem and having different extension longitudinal axes;

figure 10 shows another embodiment of the prosthesis stem, at the coupling end with the prosthesis neck;

figures 11 and 12 are respectively an end view and a cross-sectional view of the neck to be used with the prosthesis stem illustrated in figure 10.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the above figures of the accompanying drawings, the hip prosthesis structure according to the present invention essentially comprises a stem 1, consisting of a flat bar, having a given length and a surface provided with a plurality of longitudinal slots 2.

The prosthesis stem, in particular, extends according to a suitably curved longitudinal axis and has its bottom end 3 of substantially ogival shape.

The stem is moreover provided, at the top thereof, of a portion 4 enlarged at the side of its

concave perimetrical line on which there is formed a seat or recess 5 having a suitably slanted axis an oval cross-section and suitably tapered.

In this seat there is firmly housed one end 6,also shaped,of a small bar or neck 7 the other end 8 of which is so shaped as to be able of restraining a spherical head 9 adapted in turn for coupling with the acetabulum of the pelvis of the patient.

In this connection it should be pointed out that the mentioned small bar may have any desired variable length,depending on the specific use requirements.

The mentioned small bar,moreover,may have a differently slanted axis,with respect to its end engaging in the seat 5 of the stem and the axis of which,of course,will coincide with the axis of said seat.

This slanting can be essentially obtained according to any of the planes pertaining to the plane assembly passing through the line defining the axis of said seat.

More specifically,as is shown in figure 9, an embodiment of the present invention provides for the use of a neck including an insertion end which is offset from its axial extension.

Thus,a prosthesis will be formed including a neck which virtually constitutes an extension of the middle curvature,indicated at 10,of the portion of the stem.

This configuration,in actual practice,affords the possibility of inserting a neck even in prostheses of minimum thickness,while assuring a perfect and reproducible positioning of the stem-neck assembly,without any risks of a possible disengaging of the two parts.

Figures 10 to 12 show another possible embodiment in which,at the enlarged end of the stem 1 there is provided a lug 20,which has a substantially tapering shape and an elliptical plan.

From the lug 20 a cylindrical portion 21 may project,said cylindrical portion being arranged on the axial extension of said lug 20.

More specifically,said lug 20 can be engaged and firmly locked in a counter-shaped hollow 22,formed at the axial end portion of a neck of the prosthesis, indicated at 23.

If desired the hollow 22 may be provided with a recess 24 for housing the mentioned cylindrical portion 21.

From the above disclosure it should be apparent that the invention fully achieves the intended objects.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof,it should be apparent that the disclosed embodiment is susceptible to several modifications and variations all of which will come within its scope and spirit.

## Claims

1- A hip prosthesis structure,characterized in that it essentially comprises a stem (1) at the top portion of which there are provided means

(5,20) for firmly coupling the end of a shaped small bar or neck(7,23), bearing a spherical head adapted for coupling to the acetabulum of the pelvis of a patient,said small bar having a variable length and a longitudinal axis having any desired extensions.

2- A hip prosthesis structure according to the preceding claim,characterized in that said stem (1) consists of a flat small bar having a surface provided with a plurality of longitudinally extending slots (2), said stem (1) extending along a longitudinal axis and having its bottom end portion having a substantially ogival shape (3).

3- A hip prosthesis structure according to one or more of the preceding claims,characterized in that said means for coupling said shaped small bar (7) comprises a seat or recess (5).

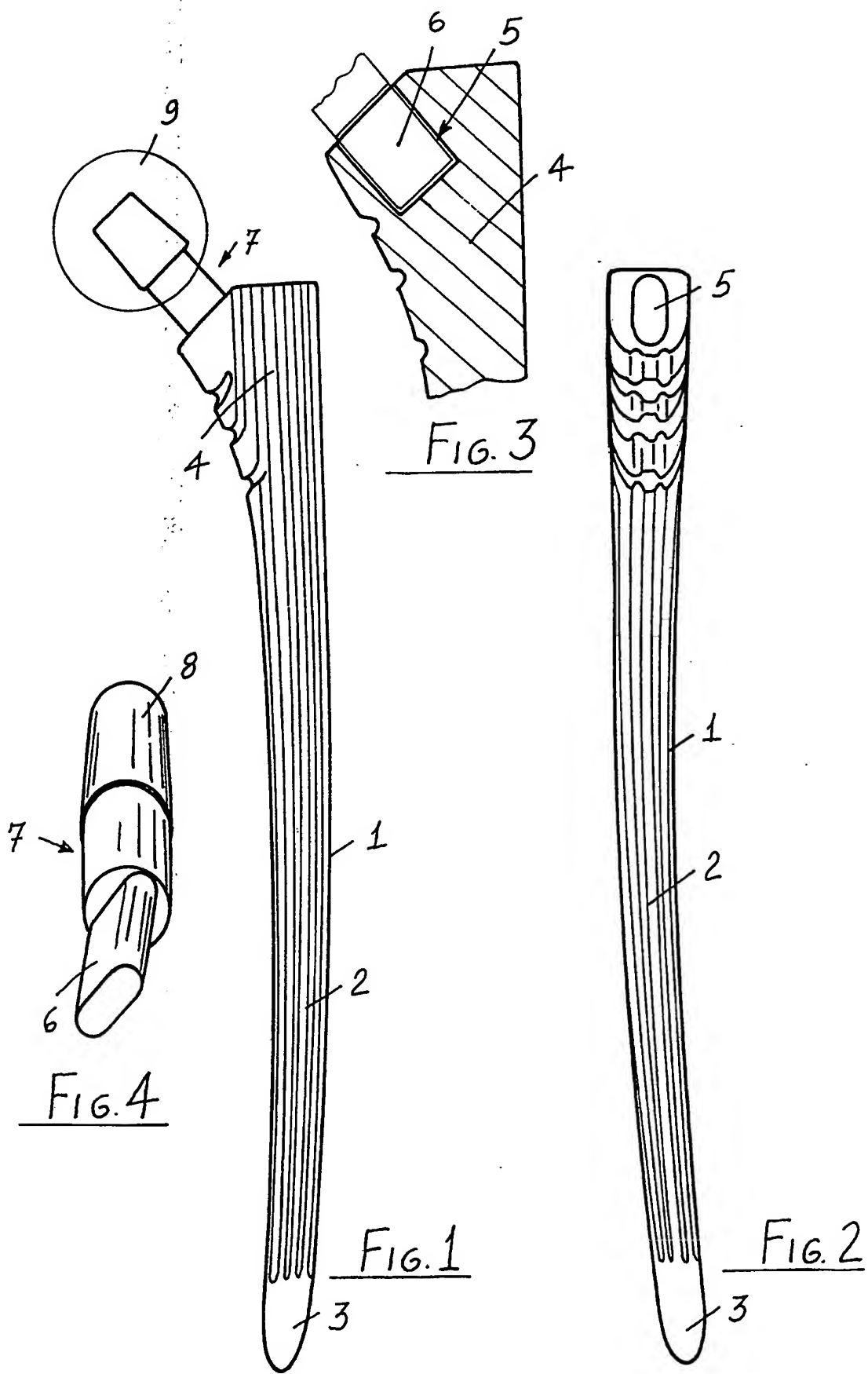
4- A hip prosthesis according to the preceding claims characterized in that said stem (1) is provided at the top thereof,with a tapering portion (4)-enlarged at the side of its concave perimetrical line-in which there is formed,with a suitably slanted axis,a seat (5) having an oval cross-section and a given tapering,within said seat there being housed in a stable way an equally shaped end portion of said small bar or neck (7).

5- A hip prosthesis structure,according to one or more of the preceding claims,characterized in that said small bar (7) has a differently slanted axis, which is differently slanted with respect to its end (6) engaging in said seat (5) and the axis of which coincides with that of said seat (5),said slanting being obtained according to any planes pertaining to the plane assembly passing through the line defining the axis of said seat (5).

6- A hip prosthesis structure according to one or more of the preceding claims,characterized in that said neck (7) is provided with an engaging or inserting end portion (6) which is offset from its axial extension thereby providing a prosthesis provided with a neck (7) which virtually constitutes an extension of the middle curvature of the top portion of said stem (1).

7- A hip prosthesis structure according to one or more of the preceding claims,characterized in that said seat (5) has a flat cross-section,similar to that of an elixoid,said configuration affording the possibility of inserting a neck (7) also into prostheses having a minimum thickness while assuring a perfect and reproducible positioning of the stem (1) - neck assembly without any possibility of disengaging of the two parts.

8- A hip prosthesis structure according to any or more of the preceding claims,characterized in that said means for coupling said shaped small bar comprise a lug (20) projecting from said stem and having a substantially frustum of cone shape with an elliptical base,said lug being adapted to be firmly engaged in a counter-shaped hollow (22) formed at one end of said neck (23).



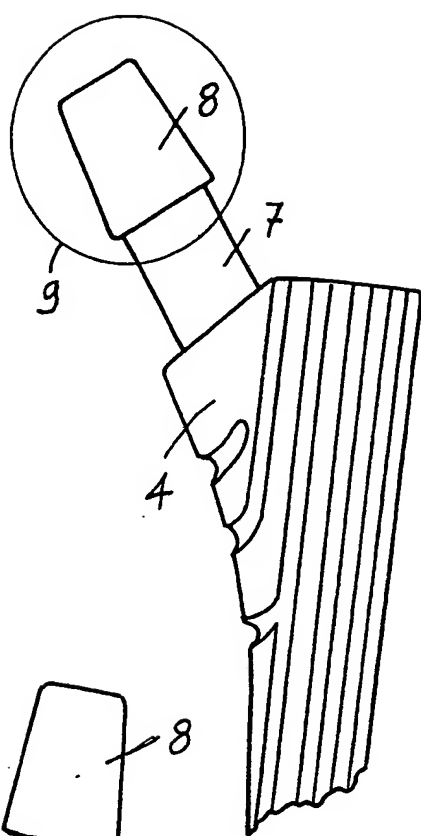


FIG. 5

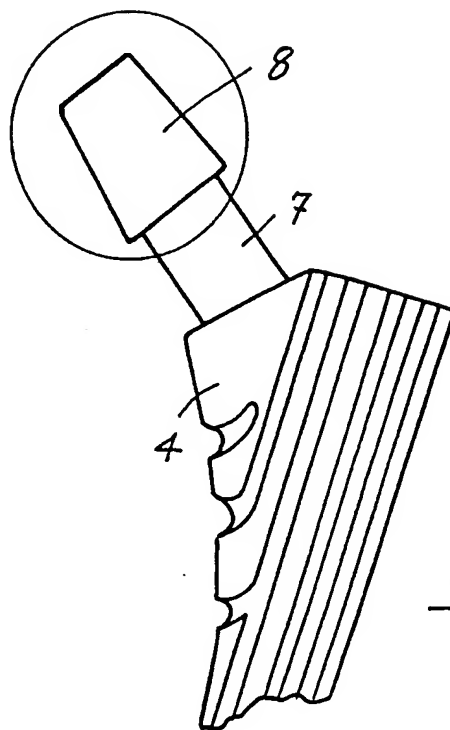


FIG. 6

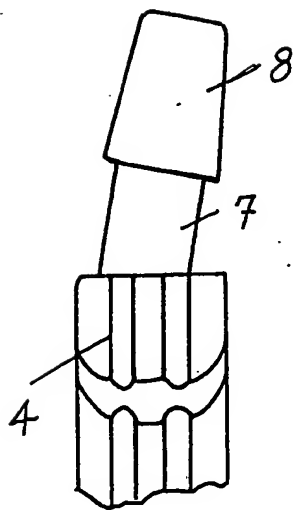


FIG. 7

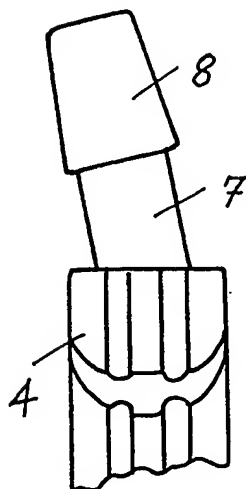


FIG. 8

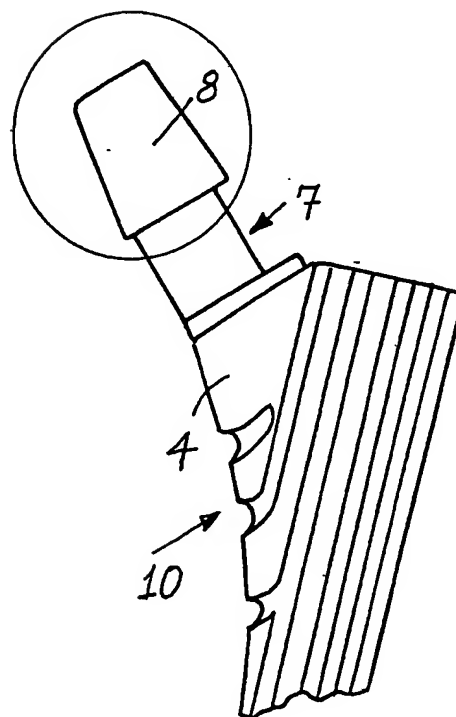


FIG. 9

